

App. Serial No. 10/538,574
Docket No.: US020590

In the Claims:

Please amend claims 1-17 and add new claim 18 as indicated below. This listing of claims replaces all prior versions.

1. (Currently Amended) An oscillator (~~200~~) comprising: a first resistor (R1), a second resistor (R2), and a capacitor (~~C~~), wherein an oscillation frequency of the oscillator (~~200~~) is dependent upon a difference between a first resistance value of the first resistor (R1) and a second resistance value of the second resistor (R2), the first resistance value being larger than the second resistance value, the first resistor (R1) exhibits a first rate of change with temperature, and the second resistor (R2) exhibits a second rate of change with temperature that is larger than the first rate of change, thereby allowing temperature-induced changes to the first resistance value to be offset by changes to the second resistance value, and thereby reducing variations in the oscillation frequency with temperature.
2. (Currently Amended) An oscillator (~~200~~) as claimed in claim 1, comprising: a first stage (~~150a-R1-160a~~), operably coupled to the first resistor (R1), that is configured to provide a first voltage level, based on the first resistance value, a second stage (~~150e-R2-160e~~), operably coupled to the second resistor (R2), that is configured to provide a second voltage level, based on the second resistance value, and a switching stage (~~110-130-170~~), operably coupled to the first stage (~~150a-R1-160a~~), the second stage (~~150e-R2-160e~~), and the capacitor (~~C~~), and is configured to: decrease a voltage on the capacitor (~~C~~) when the voltage increases to the first voltage level, increase the voltage on the capacitor (~~C~~) when the voltage decreases to the second voltage level.
3. (Currently Amended) The oscillator (~~200~~) of claim 2, wherein the first resistor (R1) substantially controls current flows through the first stage (~~150a-R1-160a~~), the second stage (~~150e-R2-160e~~), and the capacitor (~~C~~).
4. (Currently Amended) The oscillator (~~200~~) of claim 3, wherein the current flows through the first stage (~~150a-R1-160a~~), the second stage (~~150e-R2-160e~~), and the capacitor (~~C~~) are substantially equal in magnitude.

App. Serial No. 10/538,574
Docket No.: US020590

5. (Currently Amended) The oscillator (200) of claim 4, wherein the second resistance value is selected based on the first resistance value, the first rate of change, and the second rate of change.

6. (Currently Amended) The oscillator (200) of claim 5, wherein the second resistance value is selected based also on a delay associated with a feedback loop of the oscillator (200).

7. (Currently Amended) The oscillator (200) of claim 5, wherein a value of the second resistance value at a base temperature includes a factor of $R_{sub.d} * (K1 / (K2 - K1))$, and a value of the first resistance value at the base temperature is substantially equal to $R_{sub.d}$ plus the value of the second resistance value at the base temperature, where $R_{sub.d}$ corresponds to the difference between the first resistance value and the second resistance value at a base temperature, $K1$ is the first rate of change, and $K2$ is the second rate of change.

8. (Currently Amended) The oscillator (200) of claim 7, wherein the value of the second resistance value at the base temperature further includes a second factor of $(D/C) * ((Kd - K1) / (K2 - K1))$, where D is a delay associated with a feedback loop of the oscillator (200) at the base temperature, C is a capacitance value of the capacitor (C), and Kd is a rate of change of the delay with temperature.

9. (Currently Amended) The oscillator (200) of claim 1, wherein the first resistor (R1) is formed as a Ppoly resistor of a CMOS device, and the second resistor (R2) is formed as an Nwell resistor of the CMOS device.

10. (Currently Amended) An oscillator (200) comprising: a first stage (150a-R1-160a) that includes: a diode-configured Pchannel device (150a) operably coupled to a first voltage source, a diode-configured Nchannel device (160a) operably coupled to a second voltage source, and a first resistor (R1) operably coupled in series between the diode-configured P-channel (150a) and Nchannel (160a) devices, a first voltage level

App. Serial No. 10/538,574
Docket No.: US020590

being provided at a first node that couples the first resistor (R1) to the diode-configured Pchannel device (~~150a~~), a second stage (~~150e R2 160e~~) that includes a Pchannel device (~~150e~~) operably coupled to the first voltage source and having a gate that is common to the first node, a diode-connected Nchannel device (~~160e~~) operably coupled to the second voltage source, and a second resistor (R2) operably coupled in series between the Pchannel device (~~150e~~) and the diode-configured Nchannel device (~~160e~~) of the second stage (~~150e R2 160e~~), a second voltage level being provided at a second node that couples the second resistor (R2) to the P-channel device (~~150e~~); a switching stage (~~110-130, 170~~) that is configured to control a voltage on a capacitor (C) such that: the voltage is decreased when the voltage increases to the first voltage level, and the voltage is increased when the voltage decreases to the second voltage level.

11. (Currently Amended) The oscillator (~~200~~) of claim 10, wherein the first resistor (R1) has a first temperature coefficient, and the second resistor (R2) has a second temperature coefficient that is substantially larger than the first temperature coefficient.

12. (Currently Amended) The oscillator (~~200~~) of claim 11, wherein a reference voltage is provided at a reference node that couples the first resistor (R1) to the diode-configured Nchannel device (~~160a~~) of the first stage (~~150a R1 160a~~), and the switching stage (~~110-130, 170~~) includes a Pchannel device (~~150b~~) operably coupled to the first voltage source and having a gate that is common to the first node, an Nchannel device (~~160b~~) operably coupled to the second voltage source, and having a gate that is common to the reference node, wherein the switching stage (~~110-130, 170~~) is configured to couple the capacitor (C) to the P-channel device (~~150b~~) of the switching stage (~~110-130, 170~~) to increase the voltage on the capacitor (C), and couple the capacitor (C) to the Nchannel device (~~160b~~) of the switching stage (~~110-130, 170~~) to decrease the voltage on the capacitor (C).

13. (Currently Amended) The oscillator (~~200~~) of claim 12, wherein the switching stage (~~110-130, 170~~) includes: a first comparator (~~110~~) that is configured to compare the voltage on the capacitor (C) to the first voltage level, a second comparator (~~120~~) that is configured to compare the voltage on the capacitor (C) to the second voltage level, and a

App. Serial No. 10/538,574
Docket No.: US020590

bistable device ~~(130)~~ that is configured to control the coupling of the capacitor ~~(C)~~ to the Pchannel device ~~(150b)~~ and Nchannel device ~~(160b)~~ of the switching stage ~~(110-130, 170)~~, based on an output of the first comparator ~~(110)~~ and an output of the second comparator ~~(120)~~.

14. (Currently Amended) The oscillator ~~(200)~~ of claim 10, wherein a reference voltage is provided at a reference node that couples the first resistor (R1) to the diode-configured Nchannel device ~~(160a)~~ of the first stage ~~(150a-R1-160a)~~, and the switching stage ~~(110-130, 170)~~ includes a Pchannel device ~~(150b)~~ operably coupled to the first voltage source and having a gate that is common to the first node, an Nchannel device ~~(160b)~~ operably coupled to the second voltage source, and having a gate that is common to the reference node, wherein the switching stage ~~(110-130, 170)~~ is configured to couple the capacitor ~~(C)~~ to the P-channel device ~~(150b)~~ of the switching stage ~~(110-130, 170)~~ to increase the voltage on the capacitor ~~(C)~~, and couple the capacitor ~~(C)~~ to the Nchannel device ~~(160b)~~ of the switching stage ~~(110-130, 170)~~ to decrease the voltage on the capacitor ~~(C)~~.

15. (Currently Amended) The oscillator ~~(200)~~ of claim 14, wherein the switching stage ~~(110-130, 170)~~ includes: a first comparator ~~(110)~~ that is configured to compare the voltage on the capacitor ~~(C)~~ to the first voltage level, a second comparator ~~(120)~~ that is configured to compare the voltage on the capacitor ~~(C)~~ to the second voltage level, and a bistable device ~~(130)~~ that is configured to control the coupling of the capacitor ~~(C)~~ to the Pchannel device ~~(150b)~~ and Nchannel device ~~(160b)~~ of the switching stage ~~(110-130, 170)~~, based on an output of the first comparator ~~(110)~~ and an output of the second comparator ~~(120)~~.

16. (Currently Amended) The oscillator ~~(200)~~ of claim 10, wherein the switching stage ~~(110-130, 170)~~ includes: a first comparator ~~(110)~~ that is configured to compare the voltage on the capacitor ~~(C)~~ to the first voltage level, a second comparator ~~(120)~~ that is configured to compare the voltage on the capacitor ~~(C)~~ to the second voltage level, and a bistable device ~~(130)~~ that is configured to control a direction of current applied to the

App. Serial No. 10/538,574
Docket No.: US020590

capacitor (~~C~~) to increase or decrease the voltage on the capacitor (~~C~~), based on an output of the first comparator (~~110~~) and an output of the second comparator (~~120~~).

17. (Currently Amended) The oscillator (~~200~~) of claim 10, wherein the first resistor (R1) is formed as a Ppoly resistor, and the second resistor (R2) is formed as an Nwell resistor.

18. (New) The oscillator of claim 1, further including a comparator circuit to compare a voltage across the first resistor with a voltage across the capacitor and to compare a voltage across the second resistor with the voltage across the capacitor to reduce variation in the oscillation frequency with temperature.